**An efficient optimal sensor placement scheme for damage assessment of corrugated core sandwich using structural homogenization and discrete empirical interpolation method**

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**Abstract.** The effectiveness of many vibration-based and model-based structural health monitoring (SHM) techniques has been questioned due to incomplete sensed data for large-scale structures. Thus, optimal sensor placement (OSP) should offer useful data for damage assessment while also reducing deployment costs. Additionally, material homogenization is an effective and economical method for producing equivalent structures for complex structures. In this study, a combination of an effective OSP and homogenization scheme is proposed to identify damaged representative volume elements (RVEs) of corrugated core sandwich panels. Based on the mode shape datasets for intact and damaged equivalent panels, optimal sensor locations are determined by a proper orthogonal decomposition and discrete empirical interpolation method (POD-DEIM). The damage assessment is then carried out in two stages using the incomplete modal responses. In the first stage, a normalized modal strain energy based index (nMSEBI) is employed to identify the suspected damaged RVEs of the structures. In the second stage, the damage severities of these elements are predicted using a differential evolution (DE) optimization algorithm. The accuracy and efficiency of the proposed method is demonstrated through some numerical examples.

**Keywords:** Damage identification, Optimal sensor placement, POD-DEIM, Optimization, Corrugated core sandwich, Homogenization.

**Remark. The abstract should contain about 180 words, please ensure your abstract is within 1 page in length, thanks.**